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# ECONOMIC ASPECTS OF STUDENT ASSISTANCE

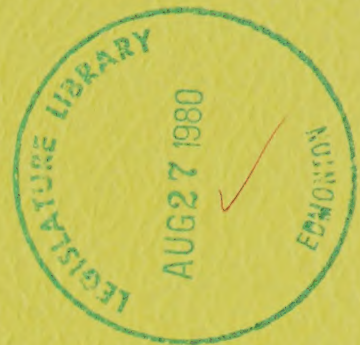
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## ECONOMIC ASPECTS OF STUDENT ASSISTANCE

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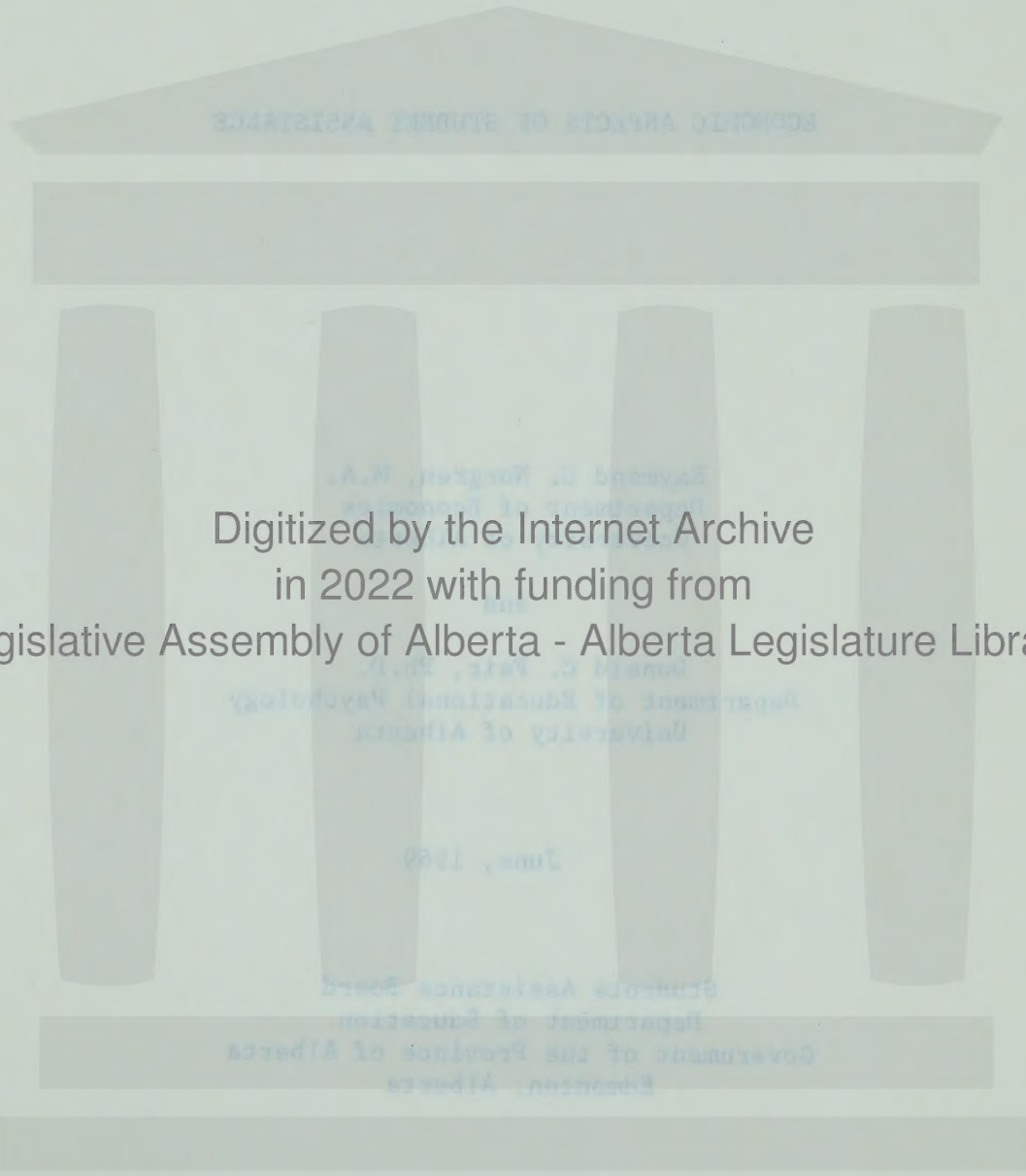
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June, 1969

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## PREFACE

In evaluating the effects of policies, it is necessary to have some standard of comparability which can be used to compare states. This standard will usually consist of the objective of the policy. If it happened that there was more than one objective then some weighting scheme would have to be introduced in which the weight would act as a measure of the desirability of one objective relative to the others. An economic illustration can be found in the behavior of a producer who has as his objective the maximization of profit. In this case alternatives are compared by the profits they provide, and the behavior is to select the activity which offers the largest profit. In this paper an attempt has been made to look at two objectives of the Students Assistance Board from an economic point of view. These are (a) that the Students Assistance Board, through its policies and procedures, should assist in efficient progression towards economic development, and (b) that in undertaking student assistance, opportunities should be equalized.

Student assistance is a complex undertaking in the sense that it is subject to political, cultural and economic pressures. What might be economically desirable may not be politically feasible. For example, it may be desirable to provide assistance to students in the lower school grades, but such may be difficult to administer, and contrary to generally held values. No attempt has been made to coordinate these diverse influences in this study. Only some of the important economic influences are considered.

This study is part of a larger research program undertaken in 1968-69 by the Students Assistance Board, Department of Education, for the purpose of reviewing present policies and practices in the granting of financial assistance to students in post-secondary educational institutions.



# TABLE OF CONTENTS

	PAGE
PREFACE.....	i
LIST OF TABLES.....	iii
LIST OF FIGURES.....	v
INTRODUCTION.....	1
EDUCATION AND ECONOMIC GROWTH.....	3
A. TECHNICAL CHANGE AS A SOURCE OF ECONOMIC GROWTH.....	4
B. THE CONTRIBUTION OF EDUCATION TO ECONOMIC GROWTH.....	5
C. UNEMPLOYMENT AND ECONOMIC DEVELOPMENT.....	9
D. PUBLIC AND PRIVATE RETURNS TO EDUCATION.....	12
EQUALIZATION OF OPPORTUNITIES IN EDUCATION.....	14
INDIVIDUAL CHOICE IN INCOME PATHS.....	25
CONCLUSIONS.....	40
RECOMMENDATIONS.....	42
REFERENCES.....	43
APPENDIX A.....	44
APPENDIX B.....	45







# LIST OF TABLES

TABLE		PAGE
I	CALCULATION OF THE EFFECTS OF LONGER EDUCATION ON LABOR EARNINGS PER MAN, CANADA AND UNITED STATES, 1911-1961...	7
II	UNEMPLOYED AS A PER CENT OF THE LABOUR FORCE BY AGE AND LEVEL OF EDUCATION, FEBRUARY, 1965.....	9
III	DURATION OF UNEMPLOYMENT, BY LEVEL OF EDUCATION, FEBRUARY, 1965.....	10
IV	FAMILY INCOME OF STUDENTS WHOSE EDUCATION WAS (a) INTERRUPTED AND (b) NOT INTERRUPTED.....	15
V	ASPIRATIONS CONCERNING UNIVERSITY AND TECHNICAL SCHOOLS BY PLACE OF RESIDENCE AND BY SEX OF GRADE XII STUDENTS IN ALBERTA IN 1965.....	15
VI	PLANS OF GRADE XII MALE STUDENTS IN ALBERTA FOR 1965 BY OCCUPATION OF FATHER.....	16
VII	EDUCATIONAL ATTAINMENT OF MALES 20-64 YEARS OF AGE, BY AGE AND FATHERS' LEVEL OF EDUCATION, CANADA, JANUARY, 1966: OUTFLOW PERCENTAGES.....	17
VIII	INDEXES OF ASSOCIATION BETWEEN THE LEVEL OF EDUCATION OF MALES 20-64 YEARS OF AGE AND THAT OF THEIR FATHERS, BY AGE OF MALES, CANADA, JANUARY, 1966.....	18
IX	EDUCATIONAL ATTAINMENT OF MALES 20-64 YEARS OF AGE, BY AGE AND FATHERS' LEVEL OF EDUCATION, CANADA, JANUARY, 1966: INFLOW PERCENTAGES.....	20
X	LEVEL OF EDUCATION OF RESPONDENTS 14 YEARS OF AGE AND OVER, BY LEVEL OF EDUCATION OF FATHER AND MOTHER, CANADA, JANUARY, 1966.....	21
XI	TOTAL RESOURCE COSTS OF UNIVERSITY EDUCATION IN ALBERTA FOR 1966.....	22
XII	ALBERTA UNIVERSITY STUDENT COSTS FOR UNDERGRADUATES IN 1966 BY TYPE OF COST.....	23
XIII	EARNINGS FOREGONE FOR A MALE STUDENT IN ALBERTA ENTERING UNIVERSITY AFTER HIGH SCHOOL IN 1966.....	23





TABLE		PAGE
XIV	MALE WAGE EARNERS 15 YEARS OF AGE AND OVER BY SCHOOLING AND AGE GROUP SHOWING AVERAGE EARNINGS FOR ALBERTA FOR 1961.....	28
XV	ALBERTA NON-FARM MALES 15 YEARS OF AGE AND OVER BY SCHOOLING AND AVERAGE INCOME FOR 1961.....	29
XVI	AVERAGE COMBINED EARNINGS OF MALES 15 YEARS OF AGE AND OVER FOR THE YEARS BETWEEN 15-25 YEARS AT VARIOUS LEVELS OF DISCOUNT RATES.....	31
XVII	DISCOUNTED LIFETIME EARNINGS OF ALBERTA MALE WAGE EARNERS 15 YEARS OF AGE AND OVER FOR 1961, BEFORE TAXES.....	32
XVIII	THE RELATIVE IMPORTANCE OF LIFETIME EARNINGS EXPRESSED AS A PERCENTAGE OF HIGH SCHOOL LIFETIME EARNINGS FOR ALBERTA MALE WAGE EARNERS 15 YEARS AND OVER FOR 1961 BY DISCOUNT RATE.....	32
XIX	DISCOUNTED LIFETIME EARNINGS AFTER TAXES OF ALBERTA MALE WAGE EARNERS 15 YEARS OF AGE AND OVER, USING 1961 DATA..	34
XX	THE RELATIVE IMPORTANCE OF DISCOUNTED INCOME STREAMS AFTER TAXES BY EDUCATION AND DISCOUNT RATES FOR ALBERTA MALE WAGE EARNERS 15 YEARS OF AGE AND OVER, USING 1961 DATA..	34
XXI	DISCOUNTED LIFETIME EARNINGS AFTER TAXES FOR ALBERTA MALE WAGE EARNERS 15 YEARS OF AGE AND OVER USING THE PERIOD 19-65 YEARS AS THE WORKING LIFE.....	35
XXII	THE RELATIVE IMPORTANCE OF DISCOUNTED LIFETIME EARNINGS AFTER TAXES FOR MALE WAGE EARNERS 15 YEARS OF AGE AND OVER, THE PERIOD 19-65 YEARS AS THE WORKING LIFE.....	35
XXIII	DISCOUNTED LIFETIME EARNINGS AFTER TAXES OF ALBERTA MALES 15 YEARS OF AGE AND OVER WITH ELEMENTARY EDUCATION WHEN THE DECISION TO PURSUE FURTHER TRAINING IS AT AGE 19....	35
XXIV	PRESENT VALUE OF UNIVERSITY TRAINING AFTER TAXES WITH AND WITHOUT LOANS BY DISCOUNT RATES.....	37
XXV	PRESENT VALUE OF UNIVERSITY TRAINING WITH SUMMER EARNINGS OF \$1,000.00 PER SUMMER BY DISCOUNT RATE.....	38





## LIST OF FIGURES

FIGURE		PAGE
I	MALE WAGE EARNERS 15 YEARS OF AGE AND OVER BY SCHOOLING AND AGE SHOWING AVERAGE EARNINGS FOR ALBERTA, 1961.....	30





## INTRODUCTION

Governments at all levels have increasingly come to recognize that "human capital" is one of the most important assets of an advanced economy. By human capital is meant the aggregate of skills and knowledge that each person has attained through formal training, job experience and awareness of surroundings, as a result of social interaction. Not only has it been found necessary to have large stocks of complex skills for the efficient functioning of an industrial nation, but education has also been found necessary for the clear understanding of urban society. Judging from its policies and expenditures, the government of the Province of Alberta has indicated that it recognizes the importance of education in developing the resources of the province. Human capacity is a resource which, if it is to be properly developed, requires a great deal of attention. This form of human resource management consists of insuring that those persons who would wish to undertake advanced training would have that opportunity. It does not suggest regimentation, but rather the recognition of the need of collective action in the interests of society and of the individual.

For the individual the opportunities made available are many. In addition to altering life time earnings, education beyond high school provides occupational options and a certain degree of protection against change. For society the benefits are to be found in the availability of a larger flow of goods and services per period, and an individual who seems generally more capable of coping with particular environments.

The Students Assistance Board assumes a very specialized role in this framework. Restrictions on the flow of students into post-secondary education is often not a function of lack of educational facilities but rather of cultural deprivation, insufficient information on opportunities, lack of finances, and other personal factors. It is these barriers with which we are concerned, and, in addition, we are concerned with the extent to which student assistance programs have been successful in coping with them.

Throughout this study expenditures on education are regarded as an investment, that is, the creation of a capital good, which will provide a path of earnings through time. The investment on the part of the public consists of the budget of the Department of Education. For the individual the investment consists of foregone earnings, and expenditures on tuition and books. Given that we can secure an estimate of the flow of earnings per year as a result of a capital expenditure, the choice criterion will be to select those alternatives that provide the greatest gains per period. The problem is not quite this simple because the order of the payment in the time sequence will be of considerable importance. A discounting process is used to introduce this aspect as explained later.





The Students Assistance Board has been assigned as its major objective the equalization of opportunities for students. This responsibility consists of recognizing the influence that diverse circumstances and varying backgrounds have on the decision of students to undertake post-secondary education. Much of this study is directed towards revealing the possibilities of unequal opportunities, and in providing an economic interpretation. There are, however, additional objectives that the Board recognizes, given that it must act as an integral part of government programs. There is the general government objective of maintaining a favorable economic environment of high levels of employment and steadily rising per capita income. The following section on "Education and Economic Growth" has been developed to indicate the importance of education to growth, and the areas of concern for student assistance.

On the matter of economic development, a programmed approach would be to project the demand for various skills based on a growth estimate, and then to see that this demand is satisfied by providing the appropriate student assistance. This method is suggestive of regimentation and for this reason is looked upon with disfavor. It should be recognized though that in many disciplines such controls exist and are used quite extensively. However, with regard to this study it will be assumed that the market mechanism, namely, differential income payments, will be effective in providing the correct signals to individuals so that they make the decision to undertake training in skills which are in short supply.

A more relevant approach, and the one that is used in the next section is to provide an estimate of the contribution of education to economic growth. This estimate will then act as an indicator of the importance of having the correct flow of skills as the economy expands.



## EDUCATION AND ECONOMIC GROWTH

Recently provincial governments have become active agents in soliciting the location of manufacturing industries within provincial boundaries. Usually the behavior has been channelled through Industrial Development Boards and provincial Credit Corporations designed to provide capital to manufacturers. This emphasis grows out of the concern for provincial economic growth which, for our purpose, is defined as a sustained increase in per capita income. This new responsibility has also grown out of the recognition that the development of industrial complexes provides substantial external benefits. The location of a manufacturing activity at a population centre may alter the costs of other producers, which can act as an inducement to further expansion. As well, the increase in employment and growth in consumer demand will provide benefits to service industries. Proper development policies can insure that the best advantage is made of the benefits resulting from economic growth. Provincial development, then, has become a policy objective partly because of the benefits accruing to local citizens, and partly because secondary benefits emerge which make the region more attractive to other industries.

Post-secondary institutions must assume a prominent role in this development process, not only in terms of providing skilled manpower, but as well in providing the concepts necessary to the evolution and understanding of urban society. The presence of large pools of skilled labor will not only attract economic activities that can effectively use the skills available, but will also have an important influence on productivity. As we shall see, education has been responsible for a great deal of the economic growth which Canada has experienced in the last fifty years. Often, persons in responsible positions have stressed the importance of our material resources as the basis for our success. There is little doubt that they have played a prominent role, but it should be borne in mind that many resources have remained of little or no value until there emerged a technology that could make use of them.

The growth of post-secondary institutions must progress more or less in proportion to the development of other areas of the economy. Failure to do so could result in restricted growth at a rate which is not necessary. For example, consider an economy in which only rabbits were desired. Assume that they could increase at the rate of a geometric progression. Assume further that only carrots could be used to feed rabbits, and that the growth of carrot production was at the rate of an arithmetic progression. The rate of growth of rabbits will be restricted to the rate of an arithmetic progression not at the faster rate of a geometric progression. In the real world substitution of inputs can take place, which would tend to raise growth rates above the rate at which the critical resource grows, but there are definite limits to substitution possibilities.





In order to focus more adequately upon the importance of education to economic development we will divide the material that follows into four sections. First, using an aggregation technique, it can be demonstrated that technical change is the most significant factor in explaining economic growth. Secondly, an estimate is made of the contribution of education to economic growth. Thirdly, the problem of unemployment is related to growth and education. And finally, a comparison is made between public and private returns to education.

#### A. Technical Change as a Source of Economic Growth

When aggregate economic behavior has important implications for understanding of the economy, relationships are specified with a high degree of aggregation. This approach has led to many important insights, but not without some shortcomings. Disregarding the difficulties, it will be useful to use the technique to reveal the major sources of economic growth in the economy.

For our purposes there is only one good, namely total output. It is produced by combining inputs - labor and capital - in certain proportions, specified by a technical relationship referred to as a production function. The following equation sets out the relationship in terms of the sources of growth.

$$\% \text{ growth of } Q = .76 (\% \text{ growth in } L) + .24 (\% \text{ growth in } K) + \text{technical change}$$

where  $Q$  = total output

$L$  = labor units

$K$  = units of capital

The ratio .76 indicates the responsiveness of output to one unit of labor input. It simply means that if you increase the labor input by one unit output will increase by .76 units. In the case of a unit increase in capital, output will increase by .24 units. Historically it has been found that in Canada 76% of Gross National Product has been paid to the factor labor, while 24% has gone to capital. The above formulation is consistent with an aggregation production function which can be represented by the Cobb Douglas<sup>1</sup> Production function. Dividing through by  $L$  we get:

$$\frac{\% \text{ change in } Q}{L} = .24\% \frac{(\% \text{ change in } K)}{L} + T.C.$$

---

<sup>1</sup>The Cobb Douglas Production Function is homogenous and of the form  $Q = AL^a K^{1-a}$  where  $a$  is the elasticity of output. If constant returns to scale prevail  $a + (1-a) = 1$ .





This form indicates that increases in labor productivity can be attributed to more capital per worker and technical change. The contribution of labor disappears for the addition of units of labor will on average be of the same productivity as all the other units. The interesting feature of the above equation is that 76% of the change in productivity per worker is due to technological change. If we allow that a good deal of technological change is embodied in new capital formation, we can safely conclude that over 50% of productivity changes can be attributed to this source.

The category of technological change includes many influences. Some of these are:

(a) Improved production techniques: new ways of combining inputs can result in an increase in output per unit of input. This form of technical change may be the result of the development of a new machine, or a different way of specializing labor.

(b) Improved education of the labor force provides labor units with more knowledge and greater sensitivity to the functioning of processes of production.

(c) Increased mobility of factors: the movement of labor from low productivity regions results in more effective use of human resources. This phenomena has taken place geographically and occupationally.

(d) Economies of scale: as the size of market increases, it may become profitable to use new techniques of production that result in a lower unit cost. It is the smallness of the Canadian market that has resulted in higher costs of production of some manufactures relative to the United States.

(e) Improvements in the health of the population, not only increases the productivity of workers, but also tends to reduce the number of days lost due to illness.

#### B. The Contribution of Education to Economic Growth.

Canadian data were used for the most part in the following analysis of the contribution of education to economic growth. It was not possible to work with data at the provincial level, for there are no figures on the education distribution of migrants by province. The stock of education skills of the residents of Alberta are due in part to training in the province, and in part to the skills that migrants add to the total. As we cannot adjust for the latter it was not possible to get a good estimate of the contribution of education to economic growth.

Table XV, Page 29 shows a clear relationship between average earnings of male residents of the province by level of education and age for 1961.



If we assume that a person is paid for his productivity, then the relationship between education and productivity becomes clear. This procedure will tend to overstate the influence of education, however, for average income received will be the result of education, intelligence, drive, family background, et cetera. In order to adjust for this influence, Bertram<sup>1</sup>, in a study quoted below for Canadian data, assumed that 3/5 of the average earnings was the result of education.

The Bertram study for Canada concentrates on the changes in the education structure of the population for the periods between 1911 and 1961. Using average income by education and age for 1961 as a weight, it is possible to arrive at the difference in income payments due to the different education structures for any two periods. The percentage change consists of a measure of the influence of a change in the education structure on aggregate income. For example, suppose we have two periods A and B, each with a specific education structure and average income distribution.

	Percent of Population		
	Period A	Period B	Average Income for Period B
Elementary	50%	30%	\$1200.00
High School	30	30	3000.00
University	20	40	6000.00
	<hr/> 100%	<hr/> 100%	

If we multiply the average income in period B by the proportionate number of persons in each educational category of period A, the income paid out will be considerably less than that corresponding to period B because there are fewer persons in the high income category. The difference between income paid out in period A and B can then be expressed as a percentage of the income paid out in period A, and used as an estimate of the contribution education has made towards raising average income. This procedure is used to estimate the influence of education on rising average income for the period 1911 to 1961. The data are set out in Table I.

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<sup>1</sup>G.W. Bertram, Contribution of Education to Economic Growth.  
Economic Council of Canada, Staff Study No. 12, 1966.





Table I  
Calculation of the Effects of Longer Education on  
Labor Earnings Per Man, Canada and  
United States, 1911-1961<sup>1</sup>

	Percent Change		Annual rate of change- per cent	
			Labor income per man based on total days of education	
	Canada	United States	Canada	United States
1911-21	2.2%	2.7%	.56%	.48%
1921-31	1.6	3.3	.41	.67
1931-41	2.6	4.1	.56	.85
1941-51	2.8	4.4	.62	1.0
1951-61	2.3	4.7	.45	.99
1911-31	3.8	6.1	.48	.57
1931-61	7.9	14.2	.54	.94
1911-61	12.0	21.2	.52	.79

The contribution that improved education has made on average income growth between 1911 and 1961 in Canada has been estimated at 12 per cent, whereas in the United States the figure was 21 per cent. These estimates are based on years of education only. Because the length of the school year has changed considerably in the last fifty years it was necessary to adjust for the number of days in the school year. Having adjusted for the number of days, the contribution improved education has made to increase in average income is estimated at 29.5 per cent in Canada and 48.6 per cent for the United States (see Column 5, Appendix A). Set out in terms of yearly influence the figure is .52 per cent per annum per man in Canada and .79 per cent per annum for the United States.

<sup>1</sup>Bertram, Page 52





The .52 per cent annual change refers only to the increase change not to total average productivity change. In Canada average productivity per worker has increased at the rate of 1.67 per cent per annum for the period from 1911 to 1961<sup>1</sup>. This figure is based on total productivity changes which include the influence of improved labor productivity and changes in the productivity of capital. Because only 76 per cent of the Gross National Product is paid to labor, the influence of a 52 per cent change in labor productivity will influence total productivity changes by  $.76 \times .52$ , which is .40. The influence of education on overall productivity changes is  $.40 / 1.67 = 24$  per cent.

If the government has as its objective a growth of per capita income of 2 per cent per annum, 24 per cent of the increase can come from a change in the education structure of the labor force. This statement is conditional on the existence of the appropriate economic environment that will absorb the skills made available. The next task would be to determine whether, given the present conditions, it is likely that the desired change in the education structure will be forthcoming. Assume that it was decided that a 50 per cent per annum change in income was to be carried out as a result of a change only in the category of university training. It would be possible to determine the increase in the number of persons that would be required. The next task would be to determine whether or not the facilities would be adequate to handle the change. Finally it would be necessary to determine from the average flow of students whether or not a sufficient number of candidates would be forthcoming. Assuming that the flow would not be adequate to satisfy the objective, then an estimate of the causes of the reduced flow would have to be secured. Given this understanding, the scope of student assistance would be determined. This illustration seems to point out that student assistance may have to be integrated with other programs if a specific growth objective has been set. A later section on Equalization of Opportunities deals with causes of a reduced flow of students.

Two points should be made clear. Although some provincial governments set growth objectives, the normal expression of concern is with industrial development, and high levels of employment within the province. Secondly, if one provincial government sets an ambitious plan for growth, considerably beyond that which prevails in Canada, it may not be successful because of income leakage and the movement of skilled labor. An example of a leakage would be if investment were undertaken which required that all materials be supplied by producers outside of the province, then the secondary effects would be minimal.

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<sup>1</sup>Bertram, Page 61.



### C. Unemployment and Economic Development

Unemployment can be the result of (a) a cyclical reduction in demand, or (b) excess supply of certain kinds of labor when ways are not flexible in a downward direction so as to clear the market. Either form constitutes a realcost to society in the sense that labor unused cannot be regained. There is a cost as well in the sense that if education is regarded as an investment, then the investment in human capital for the period in question secures no return. The appropriate way to deal with cyclical unemployment is to stimulate demand through government incentives. With reference to the second kind of unemployment, the approach often used is retraining and relocation. In either case the incidence of unemployment seems to be greater with the less educated. Table II shows the relation between unemployment, age and level of education of the Canadian labor force for the month of February, 1965.

Table II  
Unemployed as a Per Cent of the Labour Force by Age  
and Level of Education, February, 1965<sup>1</sup>

Level of Education	Age			
	14-19	20-24	25-44	45-64
Completed elementary or less	19.3%	12.7%	9.3%	7.6%
Some high school education	8.4	7.2	3.8	4.0
Completed high school or more	4.6	2.7	1.7	

As revealed in the table, unemployment plagues the uneducated in all categories. For example, the unemployment for those with elementary training is five times that for high school or more training in the age group 25-44. In total, the cost of unemployment due to lack of education must be sizable. For example, assume that all persons who are unemployed remain so for one month, and further assume that the distribution of unemployment that prevails is that which was applicable for February, 1965. Using the distribution of male wage earners for 1961, in Table XV, the cost to society for those unemployed who have only an elementary education is illustrated as follows:

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<sup>1</sup>Table 9, Page 14, Special Labor Force Studies Cat. No. 71-505, Educational Attainment of the Canadian Population and Labor Force, 1960-65.





Age	Total Monthly Cost	Average Monthly Cost
15-19	\$ 60,590.00	\$ 90.00
20-24	180,272.00	192.00
25-44	988,620.00	272.00
45-64	564,896.00	254.00
	<u>\$1,794,378.00</u>	<u>\$808.00</u>

The sum of goods and services for the month in question was reduced by \$1,794,378.00 in this example. If we associate with this amount a rate of return, then the growth rate has been reduced as well. This illustration has no general applicability other than to point out that the costs of unemployment are substantial. The problem is even more acute when one considers that this situation tends to recur throughout the life of the individual. If it could be demonstrated that student assistance did encourage continuation in school, then the cost of the assistance up to the level of the cost of the unemployment would be worthwhile.

Duration of unemployment is another matter that has considerable bearing on the cost of unemployment. Table III relates duration of unemployment to level of education.

Table III  
Duration of Unemployment, By Level  
of Education, February, 1965<sup>1</sup>

Duration of Unemployment	Total	% having finished elementary school education or less	% having some high school education	% having completed high school education or more
Unemployed less than one month: Both sexes	100.0%	57.5%	31.4%	11.1%
Unemployed 1-3 months: Both sexes	100.0	63.4	28.6	8.0
Unemployed four months or more: Both sexes	100.0	62.7	27.6	9.7

<sup>1</sup>Special Labor Force Studies Cat. No. 71-505, P. 15.



The information of Table III does not reveal a strong relationship between duration of unemployment and level of education. As the duration of unemployment increases the percentage in the elementary education category does not increase substantially. The conclusion is that duration of unemployment does not seem to be strongly influenced by the level of education.

But Table III does demonstrate that persons with less education are subject to higher rates of unemployment throughout their working life. Between the categories elementary education and high school education or more, the level of unemployment is four times greater in the first three age groups for the former relative to the latter. A great deal of income is lost during the life of persons in elementary education category, which in total would be substantial. It would seem that education plays a dual role in development in the sense that besides being the basis for higher productivity, education acts as insurance against unemployment, provided a favorable economic climate can be maintained.

The figures of Table II and III represent the economic environment for the month of February, 1965. It is not known how far this month was representative of what is generally prevailing today. There would, no doubt, be some seasonal unemployment in the data.

It should be clear that because the stock of education skills changes only slowly, a government could undertake a temporary reduction in expenditures on education with little immediate effect on production, but this will cause a ripple in productivity gains in the future. For example, let us assume that there was no migration after 1961. Table XV shows the number of male wage earners by education and age for 1961. By the end of 1962, a number of persons will have left the labor force through retirement, and this group will have a specific educational structure which will have made a contribution to the overall stock of education skills. At the same time a new group of persons will have entered the labor force with a certain distribution of skills. When we deduct for those who retire and adjust for attrition, the net addition will be an improvement in the stock if there is in fact an upward shift in the distribution of education skills. The point is that this upward shift changes the overall distribution to some degree. However, because the number of persons in the age group 15-24 is about 20 per cent of the total labor force, and because the change in the structure above what prevailed before will be relatively small, the overall effect in one year will be small. This suggests that it would be possible to have a situation in which new entrants had less education, let's say, than those replaced, without having much effect on productivity. If this change were to continue through time then finally the whole structure would change, but this would require a generation. Therefore short-run





effects will be minimal, so that a government that finds itself short of revenue could reduce educational expenditures for a limited period of time. This type of policy is probably not desirable, however, for two reasons. First, the student by this process is now the victim of the economic environment. Secondly, in terms of maintaining high levels of economic growth, the most efficient method is to produce in areas of greatest productivity. If the public rate of return to education is greater than in other government investments then expenditures should certainly not be curtailed.

The upshot of this analysis is that, having taken economic growth as an objective of the government, student aid must assume a role in satisfying this objective if the independent flow of students into post-secondary institutions is not adequate to reach the target. There is no doubt that the government has economic growth as an objective as witnessed by the behavior of departments in attracting new industries, et cetera. However, the objective is probably not systematically dealt with. In the present circumstances it is difficult to say whether the flow of students is the limiting factor to an upward shift in the distribution of education skills, or whether facilities determine the extent of the shift. Further study would reveal the critical area.

#### D. Public and Private Returns to Education

So far we have been looking at student aid with reference to the overall economic picture. However the granting of aid consists of a collection of individual decisions and the decision to allocate funds to student aid or capital expenditures in education should be undertaken on the basis of the different rates of return. If the rate of return to education is greater than that to any other activity which the government would be prepared to undertake, then the general welfare of society would be increased by making funds available to education. For example, consider the Alberta Resources Railroad. This investment cost the people of Alberta the value of the goods and services used in its construction. From this investment Alberta will receive revenue from the railroad and indirect benefits through growth. These benefits will be received yearly for many years. To establish the rate of return to this investment, equate the cost to the sum of the discounted earnings.

$$C = \frac{A_1}{(1+r)} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} + \dots + \frac{A_n}{(1+r)^n}$$

where

C = total cost of the investment

A<sub>1</sub> = the income received in year one

r = the rate of discount



In the same manner a rate of return can be arrived at for investment in education; that is, the total costs in the form of operating expenditures, capital expenditures, foregone earnings, et cetera, equated to the flow of income accruing publicly and privately. For society as a whole there will be indirect benefits resulting from having a highly skilled labor force. The private gains are the annual net additions to income associated with additional years of training. If the rate of return to education is greater than that to other investments then it is necessary, if present and future output is to be made as large as possible, to increase the allocation to education. In a study undertaken by J. S. Podoluk<sup>1</sup> the private rates of return for high school and university were 16.3 and 19.7 per cent respectively. Private rates of return use as costs only those items which are born by students. The rate of return means that for every dollar that an individual invested in university education he would receive a net payment of 19.7 cents each year of his working life. In one year his one dollar investment would be worth \$1.20 and in two years \$1.44. The public rate of return, which includes expenditures by the government and other institutions on education, would be considerably less than the private return, and is in the neighborhood of 13 per cent. Education expenditures then should be given priority whenever rates of return in other areas are less than 13 per cent. If the rates of return are the same then one should look at the indirect effects. The problem becomes rather complex when distributing the funds within the department of education for various purposes, that is, whether additional funds should be spent on technical schools, universities and junior colleges, construction of new schools, having more qualified staff or providing more assistance to students. Again we come to the flow of students. If money is spent on new facilities, when the flow is being restricted in some other way the rate of return on this expenditure will fall because of excess capacity. If the flow is being reduced by the risks attached to the undertaking on the part of students, then aid would, in the appropriate form, alter the rate of flow of students. The rate of return would tend to be maintained under these circumstances.

We now have a justification for maintaining or increasing government expenditures in education if economic growth is a major policy objective. We also possess a means of allocating funds for specific projects through a comparison of rates of return. We would possess a justification for increased expenditure on student aid if it could be shown that with appropriate adjustments in the level and form of student aid additional capable persons would pursue post-secondary training. The argument would have to show that it is not the lack of facilities which restricts entrance, but rather the economic circumstances of the individual or his cultural values.

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<sup>1</sup>S.R. Podoluk, Earnings and Education. Dominion Bureau of Statistics, Cat. No. 91-510, 1965.





## EQUALIZATION OF OPPORTUNITIES IN EDUCATION

Student aid can and should play a strong supportive role in the pursuit of economic growth, and the objective of maintaining low levels of unemployment. However, it is probably seen by many as the major tool in equalizing opportunities for young people. By "equalizing opportunities" is not meant, that the same amount of aid is available to all persons, but rather that the amount of aid varies depending on the student's circumstances. The plan of this section of the report is to examine some statistics that strongly suggest unequal opportunities. Then, where applicable, the circumstances are investigated with reference to economic theory.

Studies undertaken in industrial countries have shown that many very capable persons do not undertake college education. For example, in a study by Educational Testing Service<sup>1</sup>, in the United States, it was found that of the highest scoring 30 per cent of high school seniors in 1955, 47 per cent did not attend college. These studies also indicate that the percentage of high ability persons from low income families who aspire to attend university is lower than for comparable ability persons from high income families<sup>2</sup>. In Canada the percentage of persons who pursue university is lower than that for the United States. And, as there is little or no reason to believe that we educate the brilliant any more than is true in the American education system, probably as many of the bright students percentage-wise do not attend university. In a study undertaken by the Dominion Bureau of Statistics on Canadian undergraduate students a relationship was established between family income and those who delayed entrance to post-secondary institutions or who experienced an interruption in their studies for financial reasons. The data are given in Table IV.

The table does seem to indicate a relationship between family income and interruption in university for financial reasons. It should be borne in mind that this information does not help us to explain the behavior of those who never go to university at all. In a study conducted by Fair, entitled Vocational Plans of Alberta Youth<sup>3</sup>, 1965, some rather interesting relationships between aspirations of students by their place of residence and also by profession of father were established. Table V cross-classifies aspirations by place of residence.

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<sup>1</sup>Financing of Education for Economic Growth. Organization of Economic Cooperation and Development, Table 14, Page 232

<sup>2</sup>Financing of Education for Economic Growth. Organization of Economic Cooperation and Development, Table 15, Page 233

<sup>3</sup>Fair, Donald C., Vocational Plans of Alberta Youth. Dept. of Education, Province of Alberta, 1965



TABLE IV FAMILY INCOME OF STUDENTS WHOSE EDUCATION WAS (a) INTERRUPTED AND (b) NOT INTERRUPTED<sup>1</sup>

Family Income	Canada	
	Students with interrupted education	Students with no interruption in their education
Less than \$3,000	30.4%	13.1%
3,000 - 4,999	32.6	24.1
5,000 - 5,999	15.4	13.9
6,000 - 6,999	6.4	9.1
7,000 - 7,999	4.7	6.7
8,000 - 8,999	3.0	5.6
9,000 - 9,999	2.3	5.3
10,000 - 14,999	2.9	12.1
15,000 - or more	2.3	10.1
TOTAL	100%	100%
Average Income	\$4,201	\$5,901

<sup>1</sup>Table 32. Family income of students whose education was (a) interrupted (b) not interrupted. University Student Expenditure and Income in Canada. 1961-62. Part II Cat. no. 81-520, p. 30.

TABLE V ASPIRATIONS CONCERNING UNIVERISTY AND TECHNICAL SCHOOLS BY PLACE OF RESIDENCE AND BY SEX OF GRADE XII STUDENTS IN ALBERTA IN 1965.

Place of residence	Aspiration: % of all males		Aspiration: % of females	
	University	Tech. Instit.	University	Tech. Inst.
Large city	48%	18%	34%	6%
Small city	25	17	17	5
Town	34	21	24	5
Hamlet	29	19	21	5
Farm	25	20	22	6

Residence in a large city seems to be a definite asset in terms of acting as an influence on aspirations to attend university. This could be the result of familiarity, reduced costs, or environment which points out more directly the gains of advanced training. Also rural areas may have attached to them a certain amount of cultural deprivation. As well there could be an income effect in this data for average income varies consistently by place of residence with rural families having a lower average income. Again this data says nothing about the capable persons who have already left the school system.





TABLE VI PLANS OF GRADE XII MALE STUDENTS IN ALBERTA FOR 1965 by OCCUPATION OF FATHER.

Plans of students	Occupation of Father							Other	Total
	Professional	Managerial	Office Worker	Sales- man	Farmer	Skilled	Unskilled		
Enter University	15%	16%	6%	6%	14%	13%	8%	22%	100%
Enter Technical Institute	5	13	5	4	20	17	11	25	100
Enter Apprentice-ship	3	9	3	3	23	17	15	25	100
Seek Job	5	10	5	3	21	16	13	27	100
All male respondents	9	13	5	5	19	14	14	21	100



Using further data from the Fair study, plans of grade twelve students were related to occupations of fathers as set out in Table VI. There is a definite relationship evident between plans of students and the occupation of the father with larger proportions of the sons of professional and managerial fathers seeking to enter university.

For some time educationalists have been interested in the relationship between education of parents and that of their children. A recent study, Educational attainment in Canada: Some Regional and Social Aspects,<sup>1</sup> reveals (a) the extent to which education levels maintain themselves, that is, the relation of the father's education to that of the son, and (b) the source of each education category by education of father. These data are presented in Tables VII, VIII, and IX.

TABLE VII EDUCATIONAL ATTAINMENT OF MALES 20-64 YEARS OF AGE, BY AGE AND FATHERS' LEVEL OF EDUCATION, CANADA, JANUARY, 1966: OUTFLOW PERCENTAGES<sup>1</sup>

Age of males and fathers' level of education	Males' level of education			
	Total	University	Secondary	Elementary
20-24 years	100%	22.0%	56.0%	21.2%
University	100	63.2	34.8	*
Secondary	100	31.5	62.6	5.9
Elementary	100	11.8	56.2	32.0
25-44 years	100	14.3	48.2	37.5
University	100	56.5	38.9	*
Secondary	100	27.9	62.5	9.6
Elementary	100	8.0	45.2	46.8
45-64 years	100	9.7	36.2	54.1
University	100	48.4	37.1	*
Secondary	100	27.1	56.3	16.6
Elementary	100	5.2	32.9	61.9

\* Data are not published for samples of less than 10,000.

<sup>1</sup>Special Labor Force Studies, No.7, Dominion Bureau of Statistics, Educational attainment in Canada: some regional and social aspects. Cat. No. 71-512, 1968.





TABLE VIII INDEXES OF ASSOCIATION BETWEEN THE LEVEL OF EDUCATION OF MALES 20-64 YEARS OF AGE AND THAT OF THEIR FATHERS, BY AGE OF MALES, CANADA, JANUARY, 1966<sup>1</sup>

Age of males and fathers' level of education	Males' level of education		
	University	Secondary	Elementary
20-24 years			
University	2.9	0.6	*
Secondary	1.4	1.1	0.3
Elementary	0.5	1.0	1.5
25-44 years			
University	4.0	0.8	*
Secondary	2.0	1.3	0.3
Elementary	0.6	0.9	1.2
45-64 years			
University	5.0	1.0	*
Secondary	2.8	1.6	0.3
Elementary	0.5	0.9	1.1

\* Data are not published for samples of less than 10,000.

<sup>1</sup>Special Labour Force Studies No. 7, Dominion Bureau of Statistics, Educational Attainment in Canada: some regional and social aspects, 1968, Cat. No. 71-512

Table VII indicates the education inheritance that goes on in families. Fathers with university training were cross-classified with education of their sons. It was found that 63.2 per cent of the fathers who attended university themselves had sons in the age group 20-24 who as well went to university. One cannot help but observe the very strong relationship between education of the father and that undertaken by the son.

Table VIII is a series of index numbers. The per centages of Table VII are related in a ratio to expected frequencies if there was no relation at all between education attainments of father and son. Values greater than one indicate a strong relation between education of father and son.

Consider the categories of elementary education of father for each age category of son. If education attainment was independent of the father's education we would expect an index number value of one in the category of elementary education of father and university education of son. However we note that the values are considerably less than one,



0.5, 0.6, and 0.5 for age groups of sons 20-24, 25-44 and 45-64 yrs. respectively. The situation suggests that the likelihood of a son achieving university when the father has only elementary education is small. The relationships tend to reveal the importance of home environment on pursuit of advanced training.

It is worth noting that when the father has a university training, the index of association is high for sons with university, i.e. the likelihood of a son achieving advanced training when the father is a university trained person is high.

Another measure of the relationship between education of father and that of at least one son is the concept of self-recruitment. Males in each education category are cross-classified with education of their fathers. Table IX expresses the distribution by age group. The columns indicate the distribution of students in a category by the education of the father. We see a strong bias in the sense that although fathers with university constitute only 7.2 per cent of the population they account for 20.6 per cent of the males between 20 and 24 yrs. old who attended university, and although fathers with elementary education constitute 59.6 per cent, only 31.9 per cent of males with university have fathers with elementary education. The most obvious influence here is the distribution of sons who attained elementary education only. Ninety per cent had fathers whose educational level was also elementary only. This statistic strongly indicates one of the difficulties with our present system. It seems that the self-recruitment process for persons with elementary education is carried out almost entirely within the elementary category and although there is some upward movement it is not in proportion to the education distribution of fathers. The statistic becomes more striking when we look at the age group of sons from 20-24 years. These are persons who were born between 1942-1945. They began school in the period 1948-1951. It has been during the post-war years that a great deal of effort has gone into encouraging children to continue in school. Yet when comparing the figure of 90.0 per cent for the age group of 20-24 years with the age group 45-64 years which represent the period 1902-1921, the change is only 4.9 per cent. This analysis, of course, says nothing about the numbers in each category, just the proportions. There has been considerable upward drift in the educational achievement of children over the years. The point to be made here is that the group of sons with elementary education are recruited almost entirely from homes where the level of education of the father is elementary as well. This situation must surely indicate in part the influence of unequal opportunities. If we assume that the distribution of intelligence is normal for sons whose fathers educational level is elementary school, then human resources are being wasted.

It would seem that since the Students Assistance Board has as its objective the desire to equalize opportunities for students, then a definite program should be introduced to encourage children of parents





with only elementary education to aim higher. This would probably consist not simply of providing money, but would as well include an educational enrichment program. This is the task of the whole educational system from the teacher in the classroom to the Department of Education.

TABLE IX EDUCATIONAL ATTAINMENT OF MALES 20-64 YEARS OF AGE, BY AGE AND FATHERS' LEVEL OF EDUCATION, CANADA, JANUARY, 1966: INFLOW PERCENTAGES<sup>1</sup>

Age of males and fathers' level of education	Males' level of education			
	Total	University	Secondary	Elementary
20-24 years	100.0%	100.0%	100.0%	100.0%
University	7.2	20.6	4.4	*
Secondary	33.2	47.5	36.6	9.3
Elementary	59.6	31.9	59.0	90.0
25-44 years	100.0	100.0	100.0	100.0
University	5.2	20.7	4.2	*
Secondary	18.9	36.9	24.5	4.8
Elementary	75.9	42.4	71.3	94.6
54-64 years	100.0	100.0	100.0	100.0
University	3.7	18.4	3.8	*
Secondary	13.3	37.1	20.7	4.1
Elementary	83.0	44.5	75.5	94.9

\* Data are not published for samples of less than 10,000.

Table X relates all possible combinations of education of both parents to education of students surveyed. When both parents have the same level of education the likelihood that the child will reach the same level is very high.

There can be little doubt that educational opportunities are not equal if two persons of the same ability achieve differently simply because they come from different socio-economic groups. Nor are the opportunities equal

<sup>1</sup>Special Labor Force Studies, No. 7, Dominion Bureau of Statistics, Educational attainment in Canada: some regional and social aspects, 1968, Cat. No. 71-512



if the probability of securing advanced training is different for two persons of the same ability simply because they have been brought up in different places. This situation not only means that the chances of securing advanced training vary for individuals, it also means that the aid that is available is used only by select groups, that is, the distribution of applicants for aid is biased.

TABLE X LEVEL OF EDUCATION OF RESPONDENTS 14 YEARS OF AGE AND OVER, BY LEVEL OF EDUCATION OF FATHER AND MOTHER, CANADA, JANUARY, 1966.

Parent and parent's level of education			Respondents' level of education		
Father	Mother	Total	University	Secondary	Elementary
University	University	100%	51.0%	46.1%	*
Secondary	Secondary	100	18.8	74.9	6.3
Elementary	Elementary	100	4.8	42.9	52.3
University	Secondary	100	35.8	59.7	4.5
Secondary	University	100	38.4	57.6	*
University	Elementary	100	17.2	64.3	18.5
Elementary	University	100	24.8	59.7	15.5
Secondary	Elementary	100	10.3	68.9	20.8
Elementary	Secondary	100	9.8	70.1	20.1

\*Data are not published for samples of less than 10,000.

Economic analysis can in part explain why persons of ability do not pursue post-secondary education. The explanation lies in the rational behavior of consuming units. The major influences will of course be the cost of an education as set against the gains, the risk attached to such undertakings, and the time preference of the individual.

The cost of post-secondary education is quite high both for the individual and for society. For the individual the major cost consists of foregone earnings. In order that the relationship of all costs can be easily observed, the total resource costs of university operations in Alberta were computed for 1966. The university was used rather than other post-secondary institutions because of the availability of data. Even then a certain amount of extrapolation had to be undertaken. The procedure is outlined in Appendix B. (see also Table XI)

In computing total resource costs of university training in 1966 it is necessary to impute a cost to such items as interest on capital and allowance for depreciation. The interest is a cost, because associated with a stock of capital goods is the opportunity cost of holding resources in the form necessary to the operation of a university; that is,





income was foregone by holding these assets. In the process of training people, capital goods wear out which constitutes a use in production thereby reducing the value of the capital goods. The other very large imputed cost consists of earnings foregone. This cost is borne entirely by the student but also constitutes a cost to society resulting from the fact that in 1966 the total value of goods and services available to residents of Alberta was reduced by a gross figure of 30.6 millions of dollars because of students in attendance at university. If the students had been unemployed during the summer, this figure could have reached a maximum of 43.8<sup>1</sup> millions of dollars. Therefore in the interests of society it is important to see that summer jobs are available. It is even more important for the student, because without summer jobs the real cost of university training rises from \$7,572 to \$11,076. This difference in cost will have an effect on the decision to attend university as it will alter the rate of return. The average cost per university student in 1966 was \$5,456., of which the student paid \$2,319. The largest single cost was borne by one person, namely the recipient of a substantial portion of the benefits. We know that many capable persons enter the labor force at a very young age with poor qualifications. Student aid directed towards keeping these persons in school will raise the cost to society above the figure of \$5,456., but will provide a return to society through economic growth. It should be borne in mind that although a large portion of the benefits accrue to one person, yet society also has a large stake in this investment in that it benefits economically and it is necessary to have these skills in the economy so that a certain level of production can be maintained.

TABLE XI TOTAL RESOURCE COSTS OF UNIVERSITY EDUCATION IN ALBERTA FOR 1966<sup>1</sup>

Expenditure	
Paid by Government	\$51,284,712
Paid by Students	6,517,948
	<hr/> 57,802,660
Foregone Earnings	30,634,610
	<hr/>
Total Resource Cost	88,437,270
Portion borne by students	37,488,888
Percent borne by students	42%
42.4% or approx. 42%	

<sup>1</sup>See Appendix B



The question before us is whether or not economic matters affect the decision of students to undertake post-secondary education. At the present time, does the cost of education to the student constitute a problem to him? If we consider a nineteen year old male who is about to make an investment decision, the cost is probably very significant. Upon completion of high school the average student will possess few if any assets. With this position he must make a decision to commit \$9,276 in foregone earnings and educational costs to an investment which has attached to it a certain element of risk. The above figure is adjusted for an average scholarship and/or grant of some form or another of \$204 per year. If the student in question receives no assistance, the cost is \$10,092. If he is as well unable to secure summer employment, the cost of a degree is \$12,508 with average assistance or \$13,324 without assistance. For the individual university student, these costs are set out in Table XII.

TABLE XII ALBERTA UNIVERSITY STUDENT COSTS FOR UNDERGRADUATES IN 1966 BY TYPE OF COST.

Average yearly earnings foregone		\$2,704
Less average summer earnings		808
Earnings foregone		1,896
Tuition	\$402	
Books	150	
Transportation	75	627
Total Costs		2,523
Less Scholarships and grants	204	
Cost to student		\$2,319

Table XIII expresses the cost in forgone earnings of a four year university degree for a male student.

TABLE XIII EARNINGS FOREGONE FOR A MALE STUDENT IN ALBERTA ENTERING UNIVERSITY AFTER HIGH SCHOOL IN 1966.

Age	Gross Earnings foregone	Less summer earnings	Less part-time earnings	Net earnings foregone
19	\$1,236	\$808	\$68	\$360
20	3,280	808	68	2,404
21	3,280	808	68	2,404
22	3,280	808	68	2,404
	<u>\$11,076</u>			<u>\$7,572</u>



Every labor force entrant possesses a stock of wealth which provides him with a flow of income. For some people their only asset consists of human capital i.e. an accumulation of skill and knowledge which are marketable. For others the portfolio will be a mixture of human and non-human assets. The structure of the asset portfolio will reflect the biases of the person, his alternatives and his attitudes toward risk. In his choice, he must as well satisfy his desire for liquidity. Education is an investment which is risky and of low liquidity, i.e., not easily transferred to cash. As well, for young people, it is an investment which requires the use of all of their assets in the form of foregone earnings.

In a real sense we are asking the student to forget that he does not own any durable goods such as a car, et cetera, the ownership of which does provide some flexibility in committing an income stream to a certain kind of outlay, but are instead asking him to commit all his money income to an investment outlay. The National Housing Act will not allow prospective home owners to pay any more than 27 per cent of their income on the investment in a house and yet we are asking the student to commit \$9,276 of \$11,076 to investment in education. For the student whose demand for goods and services at the time of the decision is low the substantial gains in the future will be easily seen. However the student from a low income family who has not had the benefit of access to reasonable expenditures on goods and services, may find the real cost an insurmountable barrier.

Consider a situation in which upon graduation from high school, we gave each student \$11,076 on the condition that he do nothing for the next four years. How would he spend his money? He might consider alternative investments and their rates of return. He would probably satisfy some of his demand requirements which were felt to be immediate. In his investment decision he might create a portfolio with varying degrees of risk and liquidity, keeping on hand some cash for unexpected occurrences. His choice would probably not consist of placing the entire amount in a risky low liquidity form as would be the case if he used the money to take post-secondary training.





## INDIVIDUAL CHOICE IN INCOME PATHS

If we were to look at the process of consumer choice in a timeless framework, the individual would take his fixed income and allocate this money among the many consumer goods so as to maximize satisfaction. When time is introduced as a variable the individual must look at the way in which his demand is distributed through life and relate it to the way in which his income is distributed. Somehow if the strength of his demand does not coincide with the flow of income, he must redistribute his income, taking some from one period and putting it in another. By this process he will be able to maximize his satisfaction through time.

There are a number of variables that will affect this process of maximizing satisfaction through time. On the one hand there is his time preference, which specifies a rate of exchange between income now and income at some future date. This rate will be determined by the nature of his demand for goods through time. Although there is no reason for time preference to be positive, that is a greater preference for the present over the future, it is felt that it will normally be such because the present always seems to be of greater importance. Out of an understanding of the structure of his demand for goods and services through time in relation to the flow of income receipts will emerge savings habits. If the person knows that his demand for goods and services will be quite high at some time in the future and present demand is low, he will loan money now to be available in the future, provided the interest rate is above his time preference. We find the awareness of the relation between demand structure through time and income flows in such statements as "I must make preparation for when I am married and have a family", or "I wish I had it to do once again." One wonders if the ability to look ahead and determine today's behavior on the basis of what lies in the future is a phenomena that is attached to particular sub-groups only. We have seen that fewer high ability persons of low income families pursue lengthy post-secondary training than is the case for high ability persons of upper income categories. This suggests a strong preference for the present in the former group. Risk will affect the decision to save in two ways. First, if the person regards his chances of survival say in twenty years as low, he will alter his planning horizon. Secondly, if his savings outlets are risky he will require a premium for risk bearing.

It is in exactly this position that the high school graduate finds himself. He does have some idea of his demand for goods and services in time. He knows approximately the various time paths of income. His decision to attend a post-secondary institution is a savings type decision, that is, a postponement of present consumption in the form of earnings foregone for future income. Attached to the alternative paths of income are different degrees of risk. He can be reasonably confident



that no further education will provide him with a certain path of income, whereas to pursue a career which requires further training includes the risk attached to success in the program.

In order to analyze the factors which affect a savings decision, in our case pursuing post-secondary education, it is necessary to use cross-sectional data on income, age and education.

When average income is related by age to education one observes a very strong relationship between education and earnings. Table XIV expresses the earnings by age of males 15 years of age and over in Alberta for 1961. This data is presented graphically in Figure 1. The data are not as helpful as we would wish for the degree of aggregation hides a good deal of relevant information. The figures for elementary training include those persons with no schooling and those who only partially completed grades one to eight. As well, in high school, those who did not finish the program are included with those who did. This situation is also true of the university category.

Table XV presents a finer breakdown by education without reference to the age distribution for Alberta of non-farm males 15 years of age and over. The averages by education are considerably different which would suggest that there are meaningful sub-groups within the divisions of Table XIV.

If we were to hypothesize that the distribution of ability for persons in the no schooling and kindergarten-elementary categories was the same as for the population, an upward shift of these persons into high school, 1-3 years category, would involve a considerable productivity increase. If it is reasonable to attach to average earnings the assumption that this figure reflects the productivity of the individual, there are great gains to be made by seeing to it that most young people secure a high school education. This all presupposes an economic environment that has a strong demand for labor.

When the student is faced with a choice of careers he must look at the path of income associated with each alternative in the light of his time preference and the rate of return. In what follows, an attempt has been made to take the above data on income and to see how time preference and the rate of return will affect his decision. It will be obvious at this point that we are regarding career choice as an investment decision and we are not considering social characteristics which also influence such decisions.

As stated earlier time preference is reflected in a person's behavior (a) through his borrowing and lending habits and (b) through his occupational choice. A person with a strong preference for the present may find it unreasonable to abstain from present consumption in order that future income be increased. In order to enter this consideration into a decision which has implications for the future such as a





different path of earnings attached to post-secondary education, the process of discounting is used. If an individual strongly prefers the present to the future he may discount his future earnings by a fairly substantial rate. For example, if a person possesses a strong demand for goods in the present because he does not hold a stock of goods satisfactory to him, he may strongly prefer cash now so that he can buy the desired items. He would be prepared to take income in the future when it will be abundant relative to his demand at that time and state a rate of exchange between present and future dollars. On the other hand if his need for present dollars is low in terms of maximizing satisfaction through time then the rate of exchange between present and future money may be low, that is, eg. 1:1.03. This time preference can be stated in terms of an interest rate. The ratio 1:1.03 is equivalent to stating that the interest rate is 3 per cent. The ratio 1:1.20 is equivalent to an interest rate of 20 per cent; that is, if his time preference was such that the rate of exchange between present and future money was 1:1.20 then he would be prepared to pay an interest rate of 20 per cent per annum to secure money in the present. Also the farther an income payment is from the present the less will be its present value; that is, \$1.00 today will be worth  $1/(1.20)(1.20)$  in two years, namely \$1.44. The individual, if he borrowed at a rate of interest of 20 per cent, would be prepared to say that \$1.44 in two years is worth only \$1.00 today or if he expects to receive \$1.00 in two years, and his rate of time preference was 20 per cent then he would regard that \$1.00 as worth .69¢ today.

By using this discounting technique it is possible to arrive at the present cash value of an income stream. Its value will in large part be determined by the rate at which income is discounted. For example, consider an income stream of \$10.00 per year for the next three years. The present values are:

at 3%	<u>Year 1</u>		<u>Year 2</u>		<u>Year 3</u>	
	\$10.00		\$10.00		\$10.00	
	$\frac{10.00}{(1.03)}$	+	$\frac{10.00}{(1.03)(1.03)}$	+	$\frac{10.00}{(1.03)(1.03)(1.03)}$	
	\$9.71	+	\$9.43	+	\$9.17	= \$28.31
at 5%	\$10.00		\$10.00		\$10.00	
	$\frac{10.00}{(1.05)}$	+	$\frac{10.00}{(1.05)(1.05)}$	+	$\frac{10.00}{(1.05)(1.05)(1.05)}$	
	\$9.52	+	\$9.09	+	\$8.69	= \$27.30

If his time preference was 5 per cent someone could offer him \$27.30 now for the right to his income stream and he would take it. Also, as stated earlier, the farther an income payment is in the future the



lower its present value, and the higher the interest rate the lower will be the present value of distant earnings. Consider the average income of \$7,291 in 1961 of a college graduate at 54 years of age. The present value of this income is expressed below for the various interest rates.

Interest rate	Present value of \$7,291 at age 54
0%	\$7,291
3	2,235
5	1,036
8	336
10	161

Because the years of high income are so late in the career of a university graduate, if he possesses a strong preference for the present, say reflected in a 10 per cent interest rate, he would be prepared to exchange \$161 today for \$7,291 in forty years.

TABLE XIV MALE WAGE EARNERS 15 YEARS OF AGE AND OVER BY SCHOOLING AND AGE GROUP SHOWING AVERAGE EARNINGS FOR ALBERTA FOR 1961<sup>1</sup>.

	Average Earnings	Total Wage Earners
<u>Elementary</u>		
Total	\$2962	83,324
15-19	1080	3,898
20-24	2306	7,810
25-34	3179	20,923
35-44	3366	18,173
45-54	3190	16,197
55-64	2906	13,072
65 and over	2040	3,551
<u>Secondary</u>		
Total	3814	143,107
15-19	1054	12,512
20-24	2776	23,527
25-34	4161	46,002
35-44	4636	32,359
45-54	4659	18,389
55-64	4216	8,048
65 and over	2838	2,270
<u>University</u>		
Total	5603	27,707
15-19	694	1,050
20-24	2228	4,287
25-34	5558	9,438
35-44	7407	7,128
45-54	7291	3,660
55-64	6674	1,637
65 and over	4606	507

<sup>1</sup>D.B.S. Census Data, 94-537, Table 17, 1961



TABLE XV ALBERTA NON-FARM MALES 15 YEARS OF AGE AND OVER BY SCHOOLING AND AVERAGE INCOME FOR 1961<sup>1</sup>.

	Average Earnings	Income as a % of the income for high school, 1-3 years	Number of non-farm males
No schooling	\$1,471	36.4%	4,871
Kindergarten and Elementary	3,236	80.2	81,534
High School 1-3 years	4,032	100	61,401
High School 4-5 years	4,582	113	27,782
Some University	4,749	118	8,851
University degree	9,309	231	7,729

<sup>1</sup>D.B.S. Census Data, 94-537, Table 17, 1961





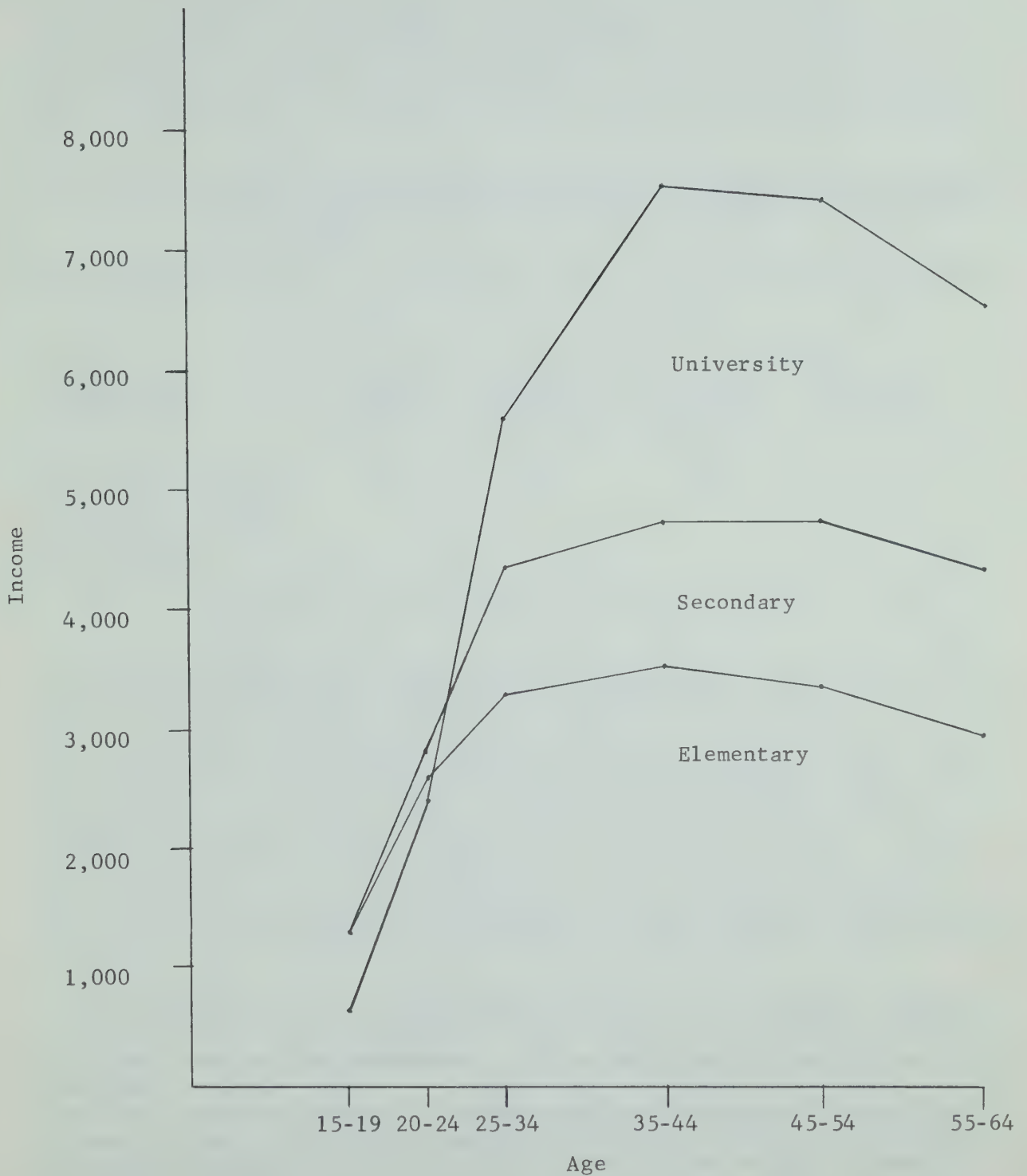


FIG. I MALE WAGE EARNERS 15 YEARS OF AGE AND OVER BY SCHOOLING AND AGE SHOWING AVERAGE EARNINGS FOR ALBERTA, 1961.



The influence of the time preference is more easily seen when the first few years are considered. In the analysis which follows we define the working life of a person as between 15 years and 65 years, so that for a person pursuing post-secondary education, earnings foregone are included as zero earnings during the years of attendance at school.

TABLE XVI AVERAGE COMBINED EARNINGS OF MALES 15 YEARS OF AGE AND OVER FOR THE YEARS BETWEEN 15-25 YEARS AT VARIOUS LEVELS OF DISCOUNT RATES.

	0%	3%	5%	8%
Elementary	\$18,109	\$16,362.42	\$14,354.04	\$11,941.73
High School	19,170	14,960.24	11,927.70	10,099.64
University	12,242	9,139.00	7,561.62	5,733.96
University earnings expressed as a per- centage of elemen- tary income	67%	56%	53%	48%

The income for the first ten years of a working life, from 15 yrs. to 25 yrs. of age, for a person pursuing university is very low. Given a positive time preference the value diminishes very rapidly as the discount rate rises as illustrated in Table XVI. We see that a student who expects that his demand for goods and services will be strong during the years of 15-25 may find university an unreasonable choice. Therefore a person with a strong preference for the present will not necessarily be impressed with gains from university training. If the social success of a person in this age group is strongly determined by his possessions, and the use of wealth, then the education decision may be postponed. However, working against this influence would be the fact that status is also tied to ones occupational level.

Of course it is the average life time earnings discounted that is relevant, for a strong demand in the ten years from 15-25 is reflected in a high rate of time preference. If an individual's time horizon is ten years he would possess a discount rate such that income after ten years would make a negligible contribution to the present value of an income stream. Table XVII illustrates the various values of lifetime discounted earnings by education for males 15 years of age and over in Alberta for 1961, before taxes.





TABLE XVII DISCOUNTED LIFETIME EARNINGS OF ALBERTA MALE WAGE EARNERS 15 YEARS OF AGE AND OVER FOR 1961, BEFORE TAXES.

	0%	3%	5%	8%	10%
Elementary <sup>1</sup>	\$134,180	\$65,678	\$44,487	\$27,545	\$21,154
High School <sup>2</sup>	178,595	83,048	54,009	31,362	22,878
University <sup>3</sup>	237,945	111,431	68,334	36,662	25,322

<sup>1</sup>Elementary includes all persons who never attended school as well as those who completed part of elementary training.

<sup>2</sup>High school includes all persons who only partially completed high school training as well as those who graduated.

<sup>3</sup>University includes degreed persons as well as those with partial university training.

The above figures reflect mortality so they are the average lifetime earnings. This figure is arrived at by using a cohort study of mortality, that is, using 1956 life tables of a cohort of 100,000 persons, 95,297 were alive at age 15. Each year some will die which will then diminish the contribution to average lifetime earnings. A person who lived through his working life would have greater lifetime earnings.

TABLE XVIII THE RELATIVE IMPORTANCE OF LIFETIME EARNINGS EXPRESSED AS A PERCENTAGE OF HIGH SCHOOL LIFE TIME EARNINGS FOR ALBERTA MALE WAGE EARNERS 15 YEARS AND OVER FOR 1961 BY DISCOUNT RATE.

	3%	5%	8%	10%
Elementary	79%	82%	87.8%	92%
High School	100	100	100	100
University	134	126	116	110

Table XVIII shows the relative importance of lifetime earnings for the three levels of education as the discount rate varies. The striking features are that (a) the relative importance of elementary education rises with a higher discount rate, while (b) the relative importance of university diminishes with higher discount rates. This clearly indicates that although university education maintains a higher present



value for the discount rates included, the difference diminishes. However it should be stated that a rational consumer will make the decision to attend university if his rate of time preference is as high or 10 per cent in a riskless world. There is reason to believe that the time preference of a person will be above 10 per cent. If people are prepared to borrow money at a rate specified by a finance company in the order of 20 per cent, then this is a good indication of a time preference of about 20 per cent. Most persons borrow money at an interest rate of above 10 per cent. If we introduce the element of risk, then a premium must be paid for risk bearing so that with a time preference of 10 per cent the relevant rate of discount would be 12 or 13 per cent depending on the risk premium. This adjustment would make the present value of a university education of less value than high school or possibly even elementary.

" An informed rational person would invest only if the expected rate of return was greater than the sum of the interest rate on riskless assets and the liquidity and risk premiums associated with the investment."<sup>1</sup>

In our analysis, we have not arrived at the rate of return. In the study undertaken by S. Pololuk, for Dominion Bureau of Statistics, the rate of return to college graduates was computed at 19 per cent. The relation to our analysis and the above rate of return is that a consumer will equate his time preference to the rate of return. If his time preference is below the market rate of interest, he will invest until they are equal. The other two factors, liquidity and risk, would probably be quite important in the individual investment in human capital. The asset of specialized training is of low liquidity in the sense that it takes many years to transform it into the form of cash. Therefore investors will often add a premium for liquidity. They require a monetary gain for holding a non-liquid asset. This is one of the reasons that long term bonds bear a higher interest rate. As well risk is not an unimportant consideration in the decision to pursue advanced training. It is present in two forms. First, there is the problem of completing the program, and secondly, there is the problem of obsolescence of skills.

It has often been stated that taxation reduces the stimulus to work beyond a certain level of income for it takes away a good portion of the rewards. Because taxation is an important deduction from earnings, its influence on the decision to pursue post-secondary education has been included. Table XIX expresses the discounted lifetime earnings after taxes, while Table XX shows the importance of discounted income streams relative to earnings of persons with high school training.

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<sup>1</sup>G.S.Becker, Investment in Human Capital: a Theoretical Analysis. J.P.E. LXX Supp. (October, 1962) p. 9-49.



TABLE XIX DISCOUNTED LIFETIME EARNINGS AFTER TAXES OF ALBERTA MALE WAGE EARNERS 15 YEARS OF AGE AND OVER, USING 1961 DATA

	0%	3%	5%	8%	10%
Elementary	\$126,676	\$62,153	\$42,189	\$26,224	\$20,184
High School	164,735	76,768	50,023	29,044	21,303
University	214,012	99,953	61,887	32,946	22,878

TABLE XX THE RELATIVE IMPORTANCE OF DISCOUNTED INCOME STREAMS AFTER TAXES BY EDUCATION AND DISCOUNT RATES FOR ALBERTA MALE WAGE EARNERS 15 YEARS OF AGE AND OVER, USING 1961 DATA

	3%	5%	8%	10%
Elementary	81%	84%	90%	94%
High School	100	100	100	100
University	130	123	113	107

A comparison with Table XVIII shows that with higher discount rates, the difference between discounted earnings decreases after taxes. At the discount rate of 10 per cent the difference in present value between elementary education and university training is only \$2,694. Given that a premium for risk and liquidity would have to be attached, this amount would probably not be a sufficient margin of difference to encourage the investment in training.

As already stated it would seem that there are very good grounds for stating that the time preference of persons is usually quite high and probably definitely higher for young people. If the time preference is greater than the rate of return then the individual will not invest or loan money, rather he will borrow or consume his stock of wealth.

If we change the working life of an individual to forty six years, defining this period as between the ages of 19 and 65 years of age, then the pursuit of post-secondary training will have a higher present value for we have excluded four years of zero earnings for high school and university students and deleted four years of positive earnings from those who completed only elementary education. It is important to bear in mind that by making this adjustment, we have removed from the analysis the most important cost to the student, namely foregone earnings. This situation is realistic only if his career choice becomes relevant upon completion of high school, or age 19.





TABLE XXI DISCOUNTED LIFETIME EARNINGS AFTER TAXES FOR ALBERTA MALE WAGE EARNERS 15 YEARS OF AGE AND OVER USING THE PERIOD 19-65 YEARS AS THE WORKING LIFE.

	3%	5%	8%	10%
Elementary	\$65,768	\$46,871	\$30,978	\$24,690
High School	86,807	61,088	39,697	31,333
University	113,084	75,578	45,182	33,657

TABLE XXII THE RELATIVE IMPORTANCE OF DISCOUNTED LIFE TIME EARNINGS AFTER TAXES FOR MALE WAGE EARNERS 15 YEARS OF AGE AND OVER THE PERIOD 19-65 YEARS AS THE WORKING LIFE.

	3%	5%	8%	10%
Elementary	75%	76%	78%	79%
High School	100	100	100	100
University	130	123	113	107

If we assume that it is not until age nineteen that persons become serious about their career, then the present values of choices for those with elementary education are quite different. This person still has the choice of pursuing further training, but at considerable cost to himself. Let us say that he exercises the adult option in finishing high school, and takes two years to complete his high school program. The discounted lifetime earnings for this person are recorded in Table XXIII. All three choices are registered.

TABLE XXIII DISCOUNTED LIFETIME EARNINGS AFTER TAXES OF ALBERTA MALES 15 YEARS OF AGE AND OVER WITH ELEMENTARY EDUCATION WHEN THE DECISION TO PURUSE FURTHER TRAINING IS AT AGE 19.

	3%	5%	8%	10%
Elementary	\$65,768	\$46,871	\$30,978	\$24,690
High School	83,295	57,689	36,353	28,193
University	109,327	72,166	42,175	30,888



If Tables XXI and XXIII are compared it is easily observed that the longer a decision is postponed the less are the discounted lifetime earnings. This situation reveals that (a) it is better to encourage people to remain in school because later the decision may not be reasonable, and (b) for persons of ability who left school at a young age, it may be necessary to provide some pecuniary incentive to encourage them to pursue further education when the present value of earnings is lower.

A quick review of our understanding so far reveals that we have good reason to believe that opportunities are not equal in the pursuit of post-secondary training in Canada. There are biases by income of the family, education of the parents, and location. Although many of the difficulties have to do with cultural attitudes, the problem can also be approached in terms of the time preference of the individual. In our society material possessions are valued for status reasons as well as the satisfaction they make available to the consumer. If one does not possess these items behavior will be such as to secure them. A high school student from a poor family may be affected by his inability to possess a relative abundance of some item. Reasonably high on his priorities, then, might be the desire to acquire these "things." We would then say that he possesses a strong time preference for the present. His desire for present goods is strong enough to make future income worth considerably less.

It would seem that a high school student just completing his program would have a difficult choice to make. At this point in his life he possesses few, if any, assets. Consumption is important to him. He is expected to assume financial responsibility for himself, and in this maze of decisions and circumstances he is expected to make a decision about his future path of income.

Let us consider for a moment the situation in which a graduating high school student finds himself with respect to his stock of wealth items, bearing in mind that we are attempting to view his position as he sees it, therefore as it will probably affect decisions. There is no judgment as to whether or not this state of affairs is right or wrong. Quite likely he will not possess a car, an item which is important in terms of transport to and from work and in terms of one's social life. Any person will find that his position in his peer group is important to him and also important for good mental health. The symbols and capital goods necessary to satisfy this standing will be important in that they will affect his behavior. The trappings of adult life which he wishes to obtain are expensive and, given that the desire attached to being adult is strong, the discrepancy between the purchasing power that one possesses and what one finds as necessary will affect a decision. The question which requires further investigation then, is does this striving have a stronger effect on persons from low income families than from high income families? There are good reasons to believe that it does. Given that consumption has





become desirable in itself, and has come to be tied to ones own self concept, deprivation can alter behavior. Also there are many experiences which are deemed desirable that require a fairly substantial outlay of funds. Even the act of socialization requires a monetary outlay. In societies where exchange is not as complicated, often members of a group can participate in activities without a cost outlay. For example, there is no entrance fee to the local tribal dance, whereas in our culture we have monetized so many group activities that lack of the necessary funds can limit ones participation in peer group situations. Such requirements will act against the student from low income groups.

One aspect of the decision to pursue post-secondary education can be said to run in favor of continuing in school. For a person with few assets it is a quick way to accumulate capital. In a sense going to school is forced saving. However there is little doubt that the undertaking is risky.

So far it has been assumed that the individual has the resources to invest his foregone earnings, that is the money necessary to maintain himself. If however, he must borrow money he will have to repay this sum plus interest from the stream of income receipts. Consider the situation where a student undertakes three years of post-secondary training at a university and that he borrows one thousand per year for a total of \$3,000. Let us assume that after one year of working he must begin repayment and the loan must be paid out in five years. The interest charge is assumed to be three and one-half per cent. During ages 23-27 he must repay the loan plus interest. Using the following repayment schedule, Table XXIV shows the present value of the income stream at various discount rates. Interest is computed annually and payment is in a lump sum at the end of each year.

<u>Age</u>	<u>Payment on Principal</u>	<u>Payment on Interest</u>	<u>Total payment</u>
23	\$600	\$105	\$705
24	600	84	684
25	600	63	663
26	600	42	642
27	600	21	621

TABLE XXIV    PRESENT VALUE OF UNIVERSITY TRAINING AFTER TAXES WITH AND WITHOUT LOANS BY DISCOUNT RATES.

	3%	5%	8%	10%
Without loans <sup>1</sup>	\$99,953	\$61,887	\$32,946	\$22,878
With loans (\$3,000)	97,586	59,966	31,529	21,715

<sup>1</sup>See Table XIX



It will be noted that for persons with high rates of discount, the effect on the present value of borrowing is not very much because the loan is repaid when money is worth less to the borrower. However if borrowing brings the present value of university training below that of say the present value of high school training, the borrower may not be interested in advanced training. In a sense the problem is of a greater magnitude than revealed because if the individual is unsuccessful in his training, he is still committed to repay the loan.

Grants have the most significant effect on altering the present value of an income stream. For example, if a student were to receive a \$1,000 grant for each of three years while at university and if his rate of discount was 10 per cent with age nineteen as the point of career decision, the grant would increase the present value of his income stream by \$2,400.00. The grant would raise the present value of university training to \$25,278, well above the present value of high school training which is \$21,303 (See Table XIX).

Another significant factor influencing present value, will be the students summer earnings. It has been assumed that student earnings will be zero while at school. Let us assume that a student will earn \$1,000 in a summer. It should be noted that in the data we are using there is already some allowance for summer earnings, and unemployment. The present value of an income stream by discount rate allowing for summer earnings is expressed in Table XXV.

TABLE XXV    PRESENT VALUE OF UNIVERSITY TRAINING WITH SUMMER EARNINGS  
OF \$1,000.00 PER SUMMER BY DISCOUNT RATE.

	3%	5%	8%	10%
With no summer earnings	\$99,953	\$61,887	\$32,946	\$22,878
With summer earnings	102,451	64,114	34,828	24,566

What is important here is that the present value at high discount rates is increased almost by the full amount of the summer earnings thereby increasing the differential between university and other levels of schooling by a considerable amount. Considering that summer earnings differ greatly by person, an equalization of opportunity would require that the influence of summer earnings on present value be equalized.

The individual is faced with a fairly complex decision as regards his pursuit of post-secondary training. On the one hand he must deal with the problem of his demand through time in relation to his flow of income receipts. He must have an estimate of his capacity to bear risk and relate that to his decision. He must also somehow deal with



the liquidity of his assets. All of these elements can be expressed in the present value of income streams. We have noted some of the major influences on the present value of life time earnings. There is the length of the working life and the time preference of the individual. Also there is ability to secure loans and grants and the fact that summer earnings have a strong influence on the present value of an income stream.





## CONCLUSIONS

1. It has been demonstrated that changes in the educational structure of the population have accounted for 25 per cent of the total productivity increases per worker in Canada from 1911 to 1961. Continued high rates of growth will require sustained expenditures on education. Although facilities act as a capacity constraint, the flow of students may have to be stimulated through student aid if the objective is to maintain high levels of productivity increases. This observation grows out of the fact that if the percentage of high school students who pursue post-secondary training is to increase above present levels, then more students will have to come from lower socio-economic homes.

2. Unemployment constitutes a real cost to society in the form of lower levels of output. Given a favorable economic environment, the unemployment rate for any age group is lower for those with higher levels of education. The Students Assistance Board could justify greater expenditures on aid if it could be demonstrated that the result was more education per person and thus a lower rate of unemployment.

3. When the students who attend post-secondary institutions, or those who aspire to attend, are cross-classified by certain characteristics, we find that strong biases exist. In the category of aspirations, educational goals are higher for those living in the two large cities of Alberta than for students of rural areas. The percentage planning to attend university is greater for children of professional fathers. There are more interruptions in university training for students of families with lower average incomes. Educational background of parents seems to exert a strong influence on the level of education of sons. The analysis has revealed that opportunities are not equal. Even the distribution of applicants for student aid will probably be biased because it deals only with the survivors of the education process. If the object of the Students Assistance Board is the equalization of opportunity then it must look seriously at the ways in which it can cooperate with other educational institutions to reduce the unfortunate influence of environment and background on many capable students.

4. By constructing a schedule of all costs of university in 1966, it was found that the student bears 42 per cent of the cost of his education. The outlay required to secure a degree is \$9,276 which will, in most cases, involve most if not all of the student's assets. This ratio of expenditures to total assets is unfavorable. Any person with the most rudimentary knowledge of investment would not commit such a large portion of his assets to one investment which is of low liquidity and risky.



5. As each person maximizes his satisfaction through time, it is necessary that he somehow bring his flow of income receipts into line with the time path of his demand. To the extent that the decision to pursue post-secondary training is a postponement of present consumption so that the flow of future receipts may increase, it requires that a person have a strong bias for future income to undertake the training. The discount rate acts as a measure of the attitude towards present and future income. It was found that for persons with a strong preference for the present, post-secondary education could be an unreasonable choice because the present value of discounted earnings was lower than for elementary school training. Allowing a premium for risk and liquidity would tend as well to make the decision a less desirable choice. Present values of income streams are quite sensitive to discount rates, the length of the working life, and summer earnings. Summer earnings should be regarded as of major importance because they alter the present value of earnings almost by the full amount. Grants as well will alter the present value considerably. These two variables jointly can be used to assure that the present value of an income stream attached to post-secondary training is of greater value than other alternatives.





## RECOMMENDATIONS

1. From an economic point of view education appears to be a sound investment both for the individual being educated and for society at large. The returns to society through increased income tax from higher salaries paid to graduates, and from greater buying power in the community are such that serious consideration should be given to making more money available in the form of grants to students in post-secondary institutions. Such increased grants should also serve the purpose of helping to change the time preferences of students who might otherwise be attracted by rather immediate earning opportunities with limited chance for advancement in the future. The magnitude of the grants should be contingent upon demonstrated need, with larger grants being given to students with greater need.

2. In view of the fact that summer earnings have a strong influence on the present value of the future income stream, it is recommended that every effort be made to increase the availability of jobs for students in the summer. It is recognized that this is not the responsibility of the Students Assistance Board, but the Board can emphasize this additional value of summer employment in contacts with appropriate agencies such as Canada Manpower.

3. The complex interaction of cultural and economic factors as they influence the decision of students to attend post-secondary institutions requires much more detailed study. It is recommended that the Students Assistance Board cooperate with other agencies, including perhaps the Human Resources Authority, in carrying out one or more pilot projects in areas of Alberta where few students continue beyond the high school level, or even complete high school. The total student population from grades one to twelve of a particular school or county might be chosen for study on a longitudinal basis. An enriched educational program might be provided for students who receive little encouragement from home, and efforts might be made to help these families develop greater interest in and enthusiasm for learning. More effective methods of communicating information regarding educational opportunities and financial assistance available might be explored. The goal would not be to try to insure that all students proceed beyond high school to some type of post-secondary education, but rather to insure that all students are adequately informed about opportunities and encouraged to maximize their abilities.



## REFERENCES

- Becker, G. S. Underinvestment in college education, American Economic Review, Vol. 50, 1960
- Bertram, G. W. Education and economic growth, Economic Council of Canada 1966
- Bladen, V. W. Commission on Financing of Higher Education-Financing higher education in Canada being the report of a Commission to the Association of Universities and Colleges of Canada, University of Toronto Press, 1965
- Denison, E. F. Source of economic growth in the United States and the alternative before us. 1962
- Houthakker, H. J. Education and Income, Vol. 41, 1959
- Machlup, F. The production and distribution of knowledge in the U.S. Princeton University, 1962
- Mincer, J. Investment in human capital and personal income distribution, Journal of Political Economy, Vol. 66, 1958
- Renshaw, E. F. Estimating the returns to education, Review of Economics and Statistics, Vol. 42, 1960
- Schultz, T. W. Education and economic growth, social forces influencing American education. The sixtieth year of National Society for the study of education.
- Schultz, T. W. Investment in human capital, American Economic Review, Vol. 51, 1961
- Solow, R. M. Technical change and the aggregate production function, Review of Economics and Statistics, Vol. 33-40, 1957-58
- Wilkinson, B. W. Present value of lifetime earnings for different education, Journal of Political Economy, Vol. 74, 1966



## APPENDIX A

CALCULATION OF THE EFFECT OF LONGER EDUCATION ON LABOUR EARNINGS PER MAN  
CANADA AND UNITED STATES, 1911-61

		Per cent change						Annual rate of change (per cent)				
		Labour income per man considering only years of education	Average number of years of school attended	Average number of days of school attended per year of school completed	Average total number of days of school attended	Labour income per man based on total days of education	Labour income per man based on total days of education					
Period <sup>1</sup>	Can.	U.S.	Can.	U.S.	Can.	U.S.	Can.	U.S.	Can.	U.S.	Can.	U.S.
1911-21	2.17	2.7	6.97	9.0	10.5	6.7	18.18	16.3	5.66	4.9	.56	.48
1921-31	1.62	3.3	5.24	8.9	7.8	8.8	13.41	18.4	4.16	6.9	.41	.67
1931-41	2.59	4.1	7.94	10.2	8.8	10.8	17.43	22.0	5.70	8.8	.56	.85
1941-51	2.81	4.4	7.48	10.9	8.8	10.9	16.96	22.4	6.37	10.4	.62	1.00
1951-61	2.27	4.7	6.15	9.8	6.1	9.3	12.59	20.0	4.65	10.3	.45	.99
1911-31	3.83	6.1	12.58	18.6	19.05	16.1	34.03	37.8	10.06	12.1	.48	.57
1931-61	7.87	14.2	23.15	33.6	25.60	34.2	54.68	79.3	17.66	32.6	.54	.94
1911-61	11.99	21.2	38.64	58.5	49.50	55.8	107.27	147.0	29.50	48.6	.52	.79

<sup>1</sup>1910-20 etc., for the United States





## APPENDIX B

## TOTAL RESOURCE COSTS OF UNIVERSITY EDUCATION IN ALBERTA FOR 1966

Operating Expenditures	\$44,778,212.94
Implicit Costs	
Depreciation on capital equipment at 2%	2,226,623.11
Depreciation on equipment at 10%	3,326,227.73
Interest on capital at 5%	7,471,596.64
	<hr/> 57,802,660.42
Earnings foregone <sup>1</sup>	30,634,610.00
Total resource costs	<hr/> 88,437,270.42
Costs to students	
Foregone earnings	30,634,610.00
Less scholarships <sup>2</sup>	3,310,240.00
	<hr/> 27,324,370.00
Fees <sup>3</sup>	6,517,948.00
Books <sup>4</sup>	2,431,200.00
Transportation <sup>5</sup>	1,215,370.00
	<hr/> 37,488,888.00

<sup>1</sup>Earnings foregone were determined by taking the age distribution of university students and arriving at average income by education level from Table XIV. The relevant figures from Table XIV have been adjusted upward by the average growth of income. Summer earnings were deducted using the average earning figure of \$808.00.

<sup>2</sup>The scholarships were computed at an average of \$150 for 14,588 undergraduates. Graduate assistance was computed at an average of \$1500 for 1,620 students less the average summer earnings of \$808.00 per person. The figure of \$150, an average scholarship, is a national estimate determined by recent D.B.S. studies.

<sup>3</sup>Fees were levied on 16,208 students at an average rate of \$402.00.

<sup>4</sup>The book allowance per student was set at an average of \$150.00.

<sup>5</sup>Transportation was set at an average of \$75.00 per student.









